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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/534,827	03/23/2000	Krysztof Matyjaszewski	00093	9987
7590	04/22/2009		EXAMINER	
Christine R Ethridge Kirkpatrick & Lockhart LLP Henry W Oliver Building 535 Smithfield Street Pittsburgh, PA 15222-2312			CHEUNG, WILLIAM K	
		ART UNIT	PAPER NUMBER	1796
		MAIL DATE	DELIVERY MODE	04/22/2009 PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/534,827	MATYJASZEWSKI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	WILLIAM K. CHEUNG	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 11 February 2009.
- 2a) This action is **FINAL**.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 86,87,90-162,224-227,270 and 289 is/are pending in the application.
- 4a) Of the above claim(s) 140-150,159-162,224-227 and 270 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 86,87,90-139,151-158 and 289 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ .                                    |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____.   | 6) <input type="checkbox"/> Other: _____ .                        |

## **DETAILED ACTION**

1. In view of the amendment filed February 11, 2009, claims 1-85, 88, 89, 163-223, 228-269, 271-288 have been cancelled, and new claim 289 has been added. Claims 86-87, 90-162, 224-227, 270, 289 are pending. Claims 140-150, 159-162, 224-227, 270 are drawn to non-elected subject matter. Claims 86-87, 90-139, 151-158, 289 are examined with merit.
  
2. In view of the amendment filed February 11, 2009, which cancel claims 1-85, 88, 89, 163-223, 228-269, 271-288, the rejection of Claim 287 under 35 U.S.C. 112, second paragraph, is withdrawn. The rejection of Claims 88, 287 are rejected under 35 U.S.C. 102(e) as being anticipated by Matyjaszewski et al. (US 5,945,491 or US 6,111,022), is withdrawn. Further, the rejection of Claims 271-272 under 35 U.S.C. 103(a) as being unpatentable over Matyjaszewski et al. (US 5,945,491) in view of Patten et al., "Atom Transfer Radical Polymerization and the Synthesis of Polymeric Materials", Advanced Materials 1998, 10 No. 12, page 901-915, is withdrawn.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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4. Claims 130, 131 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 130 (line 5), claim 131 (line 5), the recitations “about” fail to set the metes and bound of the claims. One of ordinary skill in art would not be able to understand to avoid the infringement of the claimed invention.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 86-87, 90-139, 289 are rejected under 35 U.S.C. 102(e) as being anticipated by Matyjaszewski et al. (US 5,945,491 or US 6,111,022), for the reasons adequately set forth from paragraph 7 of the office action of September 11, 2008.

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86. (Currently amended) A process for atom transfer radical addition for adding functionality to an oligomer or polymer, comprising:

reacting a first oligomer or polymer having a radically transferable atom or group with [[a]] an unsaturated second compound having a first desired functional group, the second compound reactive with the first oligomer or polymer after removal of the radically transferable atom or group, wherein the second compound is not a free radically polymerizable monomer, in the presence of a system comprising:

a catalyst which participates in a reversible cycle with the first oligomer or polymer transferring the radically transferable atom or group from the first oligomer or polymer to the catalyst, forming an active species from the first oligomer or polymer that adds the unsaturated second compound to form a second oligomer or polymer and transferring the radically transferable atom or group from the catalyst to the second oligomer or polymer,

wherein the second oligomer or polymer having the first desired functional group and the radically transferable atom or group is not reactive to the catalyst.

107. (Currently amended) A process for a catalytic atom transfer functionalization of oligo/polymeric materials having one or more radically transferable atom(s) or group(s), comprising the steps:

providing a polymer having a radically transferable atom or group; and adding a compound containing [[a]] one or more  $\alpha,\alpha$ -disubstituted olefin group and having  $\alpha$ -substituent groups to the polymer in the presence of a transition metal complex capable of undergoing a redox reaction with the radically transferable atom or group, resulting in the addition of the compound containing the  $\alpha,\alpha$ -disubstituted olefin group at the site of the radically transferable atom or group to form a second polymer, transfer of the radically transferable atom or group back to the second polymer, wherein the  $\alpha$ -substituent groups of the compound containing the  $\alpha,\alpha$ -disubstituted olefin group are selected so that the second polymer having the radically transferable atom or group is not reactive with the transition metal complex, and results in an elimination reaction involving the radically transferable atom or group to form a reactive unsaturated group.

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118. (Currently amended) A process for a catalytic atom transfer coupling of polymers comprising:

providing a first polymer having a first radically transferable atom or group;

adding a coupling compound containing one or more  $\alpha,\alpha$ -disubstituted

olefin group(s) and having  $\alpha$ -substituent groups to the first polymer in the

presence of a transition metal complex capable of undergoing a redox reaction

with the first radically transferable atom or group, resulting in the addition of the

coupling compound containing the  $\alpha,\alpha$ -disubstituted olefin group at the site of the

first radically transferable atom or group to form an extended first polymer,

transfer of the radically transferable atom or group back to the extended first

polymer, wherein the  $\alpha$ -substituent groups of the coupling compound are

selected so that the extended first polymer having the radically transferable atom

or group is not reactive with the transition metal complex, and results in and an

elimination reaction comprising the radically transferable atom or group to form a

reactive double bond; and

allowing a second polymer having a second radically transferable atom or

group in the presence of the transition metal complex to add to the reactive

double bond.

289. (New) A controlled polymerization process for the production of telefunctional multi-arm star copolymers, comprising:

polymerizing a free radically (co)polymerizable monomer in the presence of a system comprising:

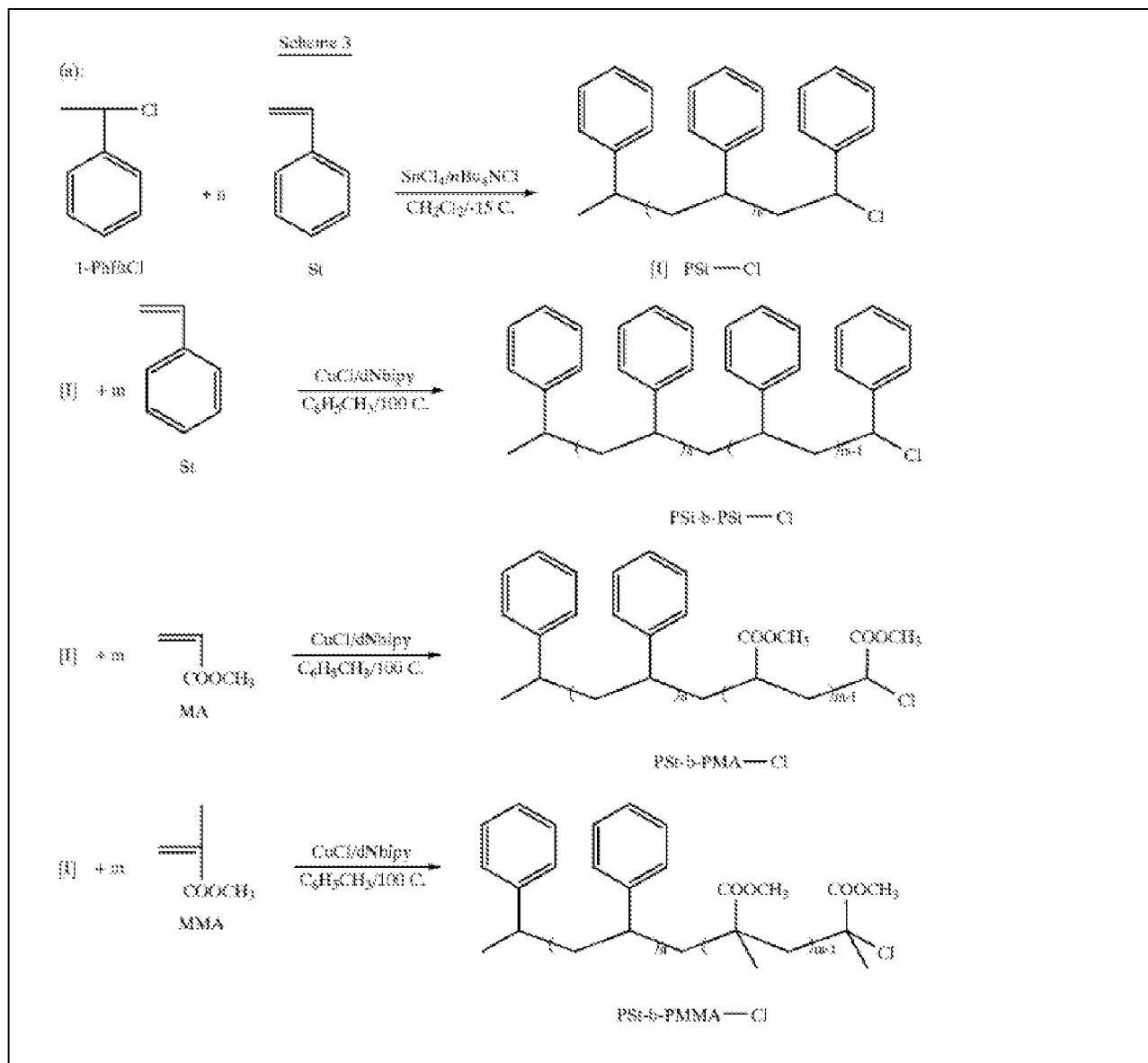
a telefunctional multi-armed star initiator comprising radically transferable atoms or groups synthesized from free radically copolymerizable monomers, and adding a second compound comprising a first desired functional group, wherein the functional groups is incorporated into the polymer at each reactive chain end.

Matyjaszewski et al. (abstract) disclose a process of atom transfer radical polymerization for the synthesis of novel homopolymer or a block or graft copolymer.

Matyjaszewski et al. (col. 16, last line of the reaction Scheme 3; col. 17, the first and the last line of the reaction Scheme 3) clearly disclose adding a coupling compound

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containing one or more  $\alpha,\alpha$ -disubstituted olefin group(s) to the first polymer in the presence of a transition metal complex capable of undergoing a redox reaction with the first radically transferable atom or group, resulting in the addition of the coupling compound containing the  $\alpha,\alpha$ -disubstituted olefin group at the site of the first radically transferable atom or group and an elimination reaction comprising the radically transferable atom or group to form a reactive double bond.



Applicant's arguments filed February 11, 2009 have been fully considered but they are not persuasive.

Applicants argue that independent claims 86, 107, and 118 and the claims dependent therefrom describe a new process of the synthesis of macromonomers having functionality that can be used in subsequent polymerization processes. The claimed process involves a second oligomer or polymer is not reactive to the catalyst because the functional group or alpha-substituent groups on the second compound do not activate the second oligomer or polymer to further ATRP polymerization. Applicants also indicate that claims 90, 107, 118 require "α,α-disubstituted olefin group and the second oligomer or polymer having radically transferable atom or group undergoes a beta-elimination reaction to form a macromer". However, applicants must recognize that Matyjaszewski et al. (abstract) disclose a process of atom transfer radical polymerization for the synthesis of novel homopolymer or a block or graft copolymer. Matyjaszewski et al. (col. 16, last line of the reaction Scheme 3; col. 17, the first and the last line of the reaction Scheme 3) clearly disclose adding a coupling compound containing one or more α,α-disubstituted olefin group(s) to the first polymer in the presence of a transition metal complex capable of undergoing a redox reaction with the first radically transferable atom or group, resulting in the addition of the coupling compound containing the α,α-disubstituted olefin group at the site of the first radically transferable atom or group and an elimination reaction comprising the radically transferable atom or group to form a reactive double bond. In view of the substantially

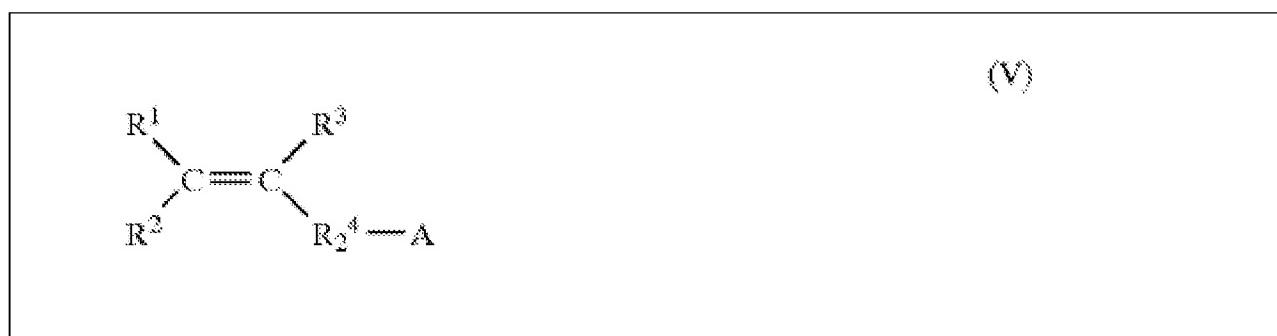
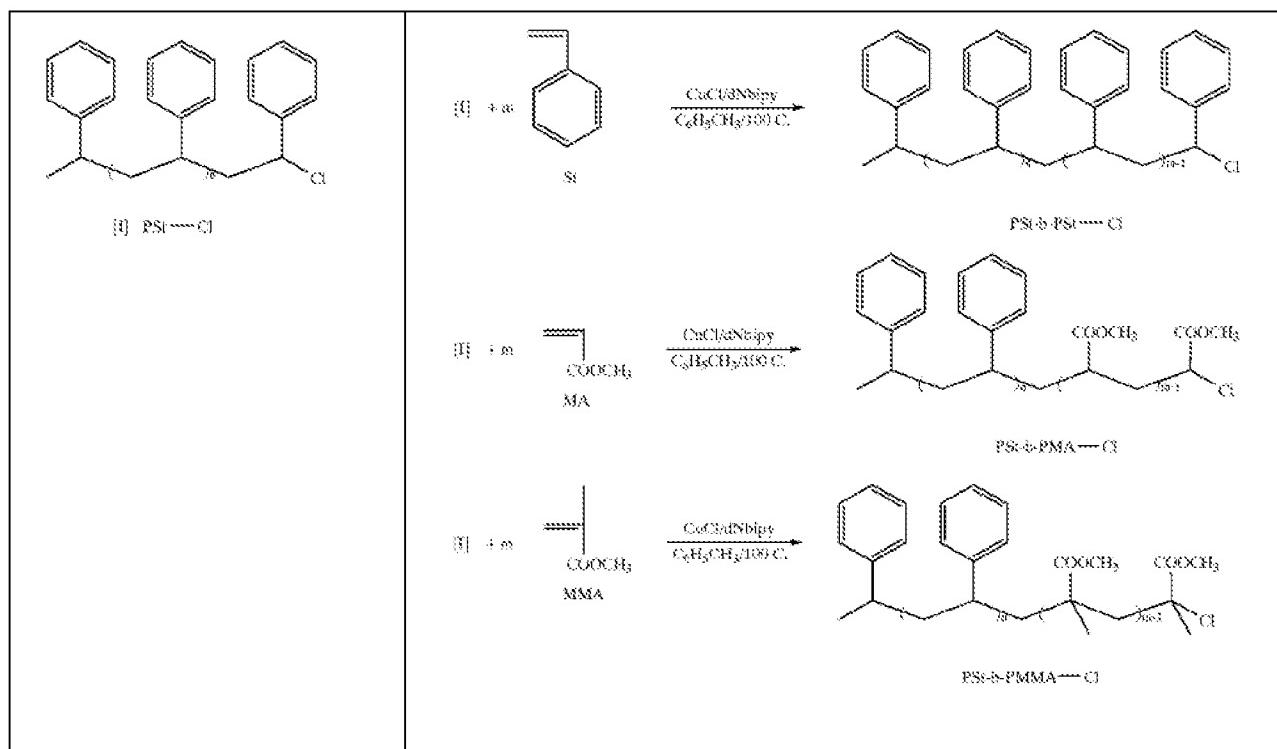
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identical composition disclosed in Matyjaszewski et al. and as claimed, the examiner has a reasonable basis that the claimed "second oligomer or polymer having the first desired functional group and the radically transferable atom or group is not reactive to the catalyst" feature is inherently possessed in Matyjaszewski et al.

Further, applicants argue that Matyjaszewski et al. teach a methyl acrylate and methyl methacrylate, instead of a methyl vinyl ketone as evident by the certificates of corrections attached to each of the '491 and '022 patents. However, even with the certificate of correction filed for '491 and '022, applicants must recognize that the issues have not been resolved regarding "resulting second oligomer or polymer is not reactive to the catalyst" being argued.

First applicants must recognize that claim 89 has been cancelled. Regarding applicants' argument that Matyjaszewski et al. do not teach a reaction scheme that requires "an elimination reaction involving the radically transferable atom or group to form a reactive unsaturated group" set forth in claims 107 and 118, applicants must recognize that (col. 16, last line of the reaction Scheme 3; col. 17, the first and the last line of the reaction Scheme 3) clearly disclose the reactive species (I) PSt-Cl as indicated below. Regarding the argued "elimination step", in view of the substantial identical catalyst disclosed in Matyjaszewski et al. and as claimed, the examiner has a reasonable basis that the claimed "elimination" mechanism is inherently possessed in Matyjaszewski et al. Applicants must recognize that a prior art is not required to show the reaction mechanism of a reaction that is inherently possessed by the disclosed reaction or polymerization process.

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Also, applicants fail to recognize that the claims 107-139 as written do not require the second compound to be not free radically polymerizable.

6. Claims 151-158 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matyjaszewski et al. (US 5,945,491) in view of Patten et al., "Atom Transfer Radical

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Polymerization and the Synthesis of Polymeric Materials", Advanced Materials 1998, 10 No. 12, page 901-915, for the reasons adequately set forth from paragraph 8 of the office action of September 11, 2008.

151. (Currently amended) A controlled polymerization process, comprising:  
adding a core forming compound to an active atom transfer radical polymerization process; and  
reacting polymer chains having a radically transferable atom or group with the core forming compound to form the a multi-arm star copolymer,  
wherein the core forming compound is a divinyl compound.

Matyjaszewski et al. (abstract) disclose a process of atom transfer radical polymerization for the synthesis of novel homopolymer or a block or graft copolymer. Matyjaszewski et al. (col. 16, last line of the reaction Scheme 3; col. 17, the first and the last line of the reaction Scheme 3) clearly disclose adding a coupling compound containing one or more  $\alpha,\alpha$ -disubstituted olefin group(s) to the first polymer in the presence of a transition metal complex capable of undergoing a redox reaction with the first radically transferable atom or group, resulting in the addition of the coupling compound containing the  $\alpha,\alpha$ -disubstituted olefin group at the site of the first radically transferable atom or group and an elimination reaction comprising the radically transferable atom or group to form a reactive double bond.

Applicants argue that Matyjaszewski et al. are silent on that "the second compound is not a free radically polymerizable monomer". However, the argument is not supported by the claims as written because the claims are silent on a feature that requires the second compound not to be a free radically polymerizable monomer.

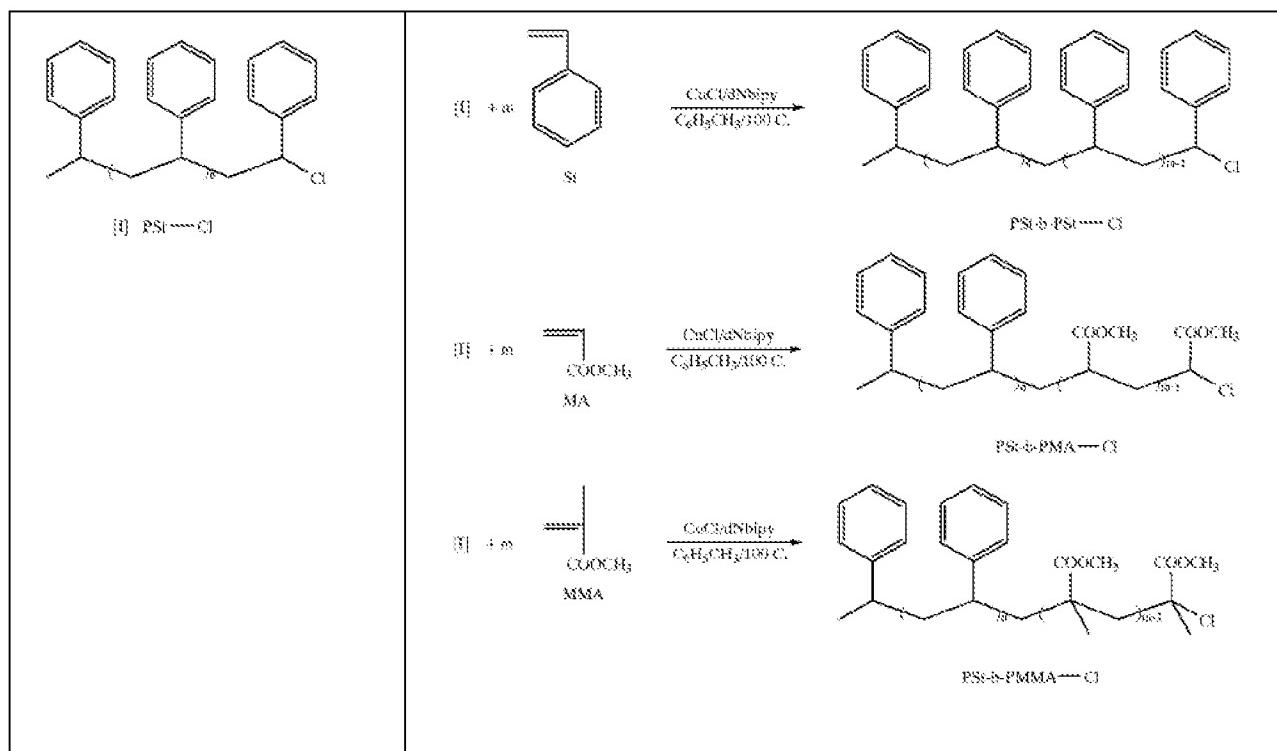
The difference between the invention of claims 151-158 and Matyjaszewski et al. is that Matyjaszewski et al. are silent on a process comprising a core forming compound or a telefunctional multi-armed star copolymers.

Patten et al. (page 901, Figure 1) disclose that a core forming compound or a telefunctional multi-armed star copolymers can be prepared by atom transfer radical polymerization processes. Therefore, motivated by the expectation of success of preparing a star or a multi-arm structure of Patten et al. (page 901, Figure 1), it would have been obvious to one of ordinary skill in art to incorporate the star or multi-arm structure of Patten et al. to obtain the invention of claims 151-158.

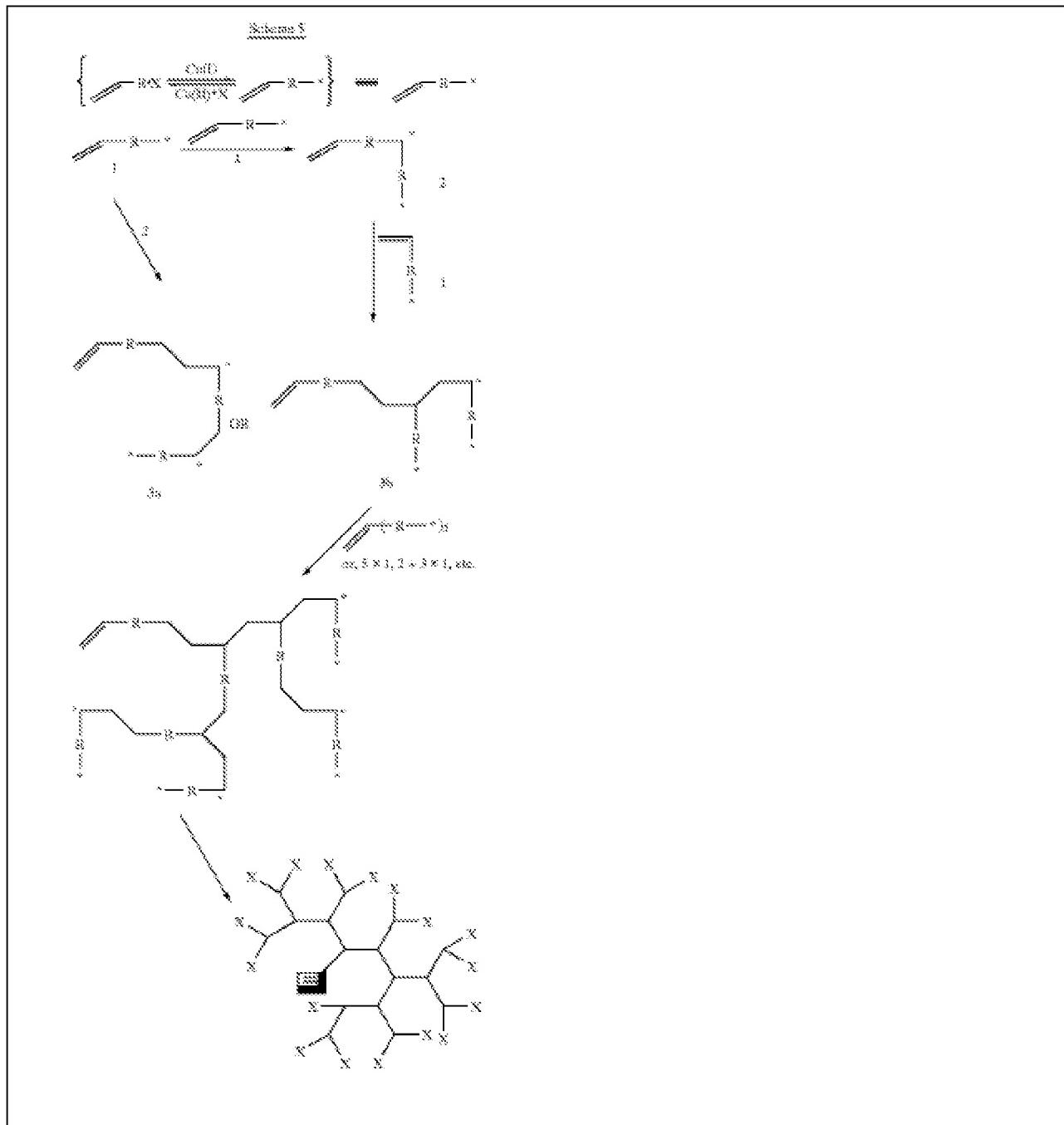
Applicant's arguments filed February 11, 2009 have been fully considered but they are not persuasive.

Applicants argue that claims 151-158 relates to an "arm-first" approach to the synthesis of a multi-arm star copolymer, whereas Matyjaszewski et al. disclose a step wise approach to star copolymers. Applicants argue that the "arm-first" approach is clearly supported by the amended claim 151 which recites "reacting polymer chains having a radically transferable atom or group with the core forming compound to form the multi-arm star copolymer. However, applicants fail to recognize that the disclosed structure [I] is the polymer chain having a radically transferable atom or group, and the ethylenically unsaturated compounds disclosed can be considered the argued "core forming compound".

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Regarding the claimed “multi-arm star copolymer”, Matyjaszewski et al. (col. 23, scheme 5) clearly disclose the “multi-arm star copolymer” as claimed.



***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William K. Cheung whose telephone number is (571) 272-1097. The examiner can normally be reached on Monday-Friday 9:00AM to 2:00PM; 4:00PM to 8:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David WU can be reached on (571) 272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/William K Cheung/  
Primary Examiner, Art Unit 1796

William K. Cheung, Ph. D.  
Primary Examiner  
April 20, 2009